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(54) Title: **SYSTEM AND METHOD FOR SYNCHRONIZING ONLINE ACTIVITIES WITH BROADCAST PROGRAMMING**

(57) Abstract: A system allows large numbers of users to engage in on-line, multi-user shows that are synchronized to broadcasts of prerecorded or live shows and also simultaneously aggregates user input from such shows and feeds it back into the broadcast. First, a user launches client application on an Internet-accessible platform. The client application connects to a multi-user server system. This multi-user server system allows all of the concurrent users to engage in a single multi-user, on-line activity that can run independently or in synchronization with a broadcast. The multi-user server system is also capable of running numerous on-line activities simultaneously, each of which can be synchronized to a separate broadcast. As the users interact with the on-line activities, the multi-user server system can aggregate data relating to the users or their actions, save this data in a database, and feed this back into the broadcast. The multi-user server system also includes the ability to send messages to all the users or specific groups of users, adjust the synchronization of the on-line shows, schedule on-line shows, and create scripts for running the shows in synchronization with the broadcasts.

SYSTEM AND METHOD FOR SYNCHRONIZING ONLINE ACTIVITIES WITH BROADCAST PROGRAMMING

BACKGROUND OF THE INVENTION

5 1. Field of the Invention

The present invention relates to systems for synchronizing broadcast media transmissions with other forms of communication. More specifically, it relates to systems which allow a large number of broadcast media recipients to engage in on-line activities that are synchronized to transmissions of the broadcast medium -- television, radio, Internet or any other
10 type of broadcasts, while simultaneously aggregating user input and feeding it back into the broadcast transmission.

2. Background of the Related Art

Radio and television broadcasting have revolutionized the way that information and
15 entertainment are distributed in the 20th century and have become truly ubiquitous. Nearing the end of the 20th century, the development of the Internet and the World Wide Web have provided the opportunity to bring a new, powerful technology for providing information and entertainment via a worldwide network of computers to tens of millions of users.

By tightly integrating the user experience of broadcasting and the Internet, it would
20 be possible to create new shows and content that would greatly extend the capabilities of both media. Tightly coordinated on-line / on-air programming could be used for a wide variety of content types, including game shows, news / opinion shows, sports, entertainment, education shows, children's programming, and advertisements. Additionally, if such integration could

support the simultaneous coordinated activities of a very large numbers of users, it would further extend the creative possibilities and support the development of robust on-line / on-air communities. Finally, this system could be capable of driving real-time information back into the broadcast in order to "close the loop" and fully integrate the coordinated user experience.

5 However, there is a challenge imposed by such an environment. The deployment of systems using enhanced set-top boxes and cable system head-end equipment is delayed by a fractious standards battle and the reluctance of broadcasters and cable system operators to invest in potentially soon-to-be obsolete technology. Meanwhile, there is a huge pent-up demand for combined Internet / broadcast programming, as evidenced by the millions of users who
10 simultaneously access the Internet on a personal computer while watching television (estimated by one study to be 18 million households) without any content or shows being created to support that activity.

A system which uses innovative software technology and content delivery methods is needed to achieve the tight broadcast / Internet integration so many users desire. This system
15 must do so in a manner that allows rapid deployment as well as adaptability to future developments in cable television and broadband delivery systems.

This system should achieve its tight coordination with broadcasts at the broadcast control and Internet server level in order to avoid the fractured and technically uncertain environment presented by attempting to deploy content using other cable television, satellite or
20 broadband-based technologies. The client application design should support being deployed on a wide range of client devices, from current personal computers to devices not yet built. The client / server design should provide a tight synchronization for the users' on-line / on-air experience no matter what variations they may experience in network latency and bandwidth. Multi-user server

capabilities must be included to support the simultaneous response of very large numbers of users in coordination with the broadcasts. The server system should be able to aggregate, track, archive and report on the simultaneous multi-user activities while storing the data and user profiles in a database. In addition, the system should drive real-time information and graphics back into the broadcast to fully complete the "loop" for the users' on-line / on-air experience. Finally, this system must be robust, reliable and scalable to meet the real-world demands of broadcasters.

SUMMARY OF THE INVENTION

The present invention has been made with the above problems of the prior art in mind, and it is an object of the present invention to provide a method and system by which large numbers of users engage in on-line, multi-user shows that are synchronized to television, radio, Internet or any other type of broadcasts, while simultaneously aggregating user input and feeding it back into the broadcast.

According to a first aspect of the present invention, this object is achieved by providing a system in which a user first launches a client application which is either downloaded from the Internet or pre-installed on the user's Internet access device. The client application is based on a set of Application Programming Interface (API) modules which are created as part of the system and designed to be easily deployed on a wide range of Internet access devices. These devices can be Internet-enabled personal computers, enhanced set-top box devices, wireless devices, Internet access appliances or any other devices that support a programming language and standard Internet communication protocols.

Next, the client application connects to a multi-user server system. This multi-user server system allows all of the concurrent users to engage in a single multi-user, on-line activity

that can run independently or in synchronization with a broadcast. The multi-user server system is also capable of running numerous on-line activities simultaneously, each of which can be synchronized to a separate broadcast. These on-line activities can be integrated with virtually every type of content, both pre-recorded and live shows, including but not limited to news / opinion shows, sports, drama, comedies, game shows and advertisements. The on-line activities include all types of multi-user and single-user applications, including, but not limited to, chat, games, opinion polling, interactive commercials, and e-commerce. The client / server system provides a tight synchronization for the on-line / on-air content, which accommodates variations in the Internet network's and user's connection latency and bandwidth.

As the users interact with the on-line activities, the multi-user server system will aggregate data relating to the users and/or their actions, save this in a database and feed relevant data back into the broadcast as graphics or other forms of information. The multi-user server system also includes the ability to send messages to all users or specific groups of users, adjust the synchronization of the on-line shows, schedule on-line shows, and create scripts for running the shows in synchronization with the broadcasts. The multi-user server system is deployed in a primary / secondary server configuration, where the loads are distributed across multiple server computers. This helps to make the system easily scalable for expansion to accommodate increasing user numbers. The system preferably provides a control application so that broadcast control room personnel may manage the combined on-line / on-air content. Additionally, the system provides broadcasters tools for creating the on-line / on-air content, specifically a scheduling application and a show scripting application.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects, features and advantages of the present invention are better understood by reading the following detailed description of the preferred embodiment, taken in conjunction with the accompanying drawings, in which:

- 5 FIG. 1 shows an overview of a presently preferred embodiment of the present invention;
FIG. 2 is a flow diagram showing how the embodiment functions;
FIG. 3 is a diagram showing various client devices usable in the preferred embodiment;
FIG. 4 is a block diagram showing the server system configuration in the embodiment; and
FIG. 5 is a time-based chart depicting the sync-to-broadcast system flow in the
10 embodiment.

DETAILED DESCRIPTION OF

PRESENTLY PREFERRED EXEMPLARY EMBODIMENTS

- The present invention provides, in a preferred embodiment, a system that allows
15 large numbers of users to engage in on-line multi-user activities that are tightly integrated and
synchronized with television, radio, Internet or other types of broadcasts, while simultaneously
aggregating user input and feeding real-time information pertaining thereto back into the broadcast.
This is deployed in a client / server environment. The system achieves its tight coordination with
broadcasts at the broadcast control / Internet server level in order to maximize control of the
20 synchronization and integration and avoid depending upon downstream technologies which may or
may not be available to all users.

FIG. 1 provides an overview of the preferred embodiment, illustrating how all the
components work together to synchronize multi-user on-line activities to a broadcast. Here, a

broadcaster 101 transmits a broadcast signal 102 which may involve a television broadcast, radio, the Internet or any other type of broadcast. Although in the following discussion reference will be made to television broadcasts, this is in no way limiting, and the transmission may be via cable, airwaves, network or any other type of transmission medium.

5 Audience households 103 receive the broadcast 102 via an appropriate device such as a satellite dish, antenna, cable, Internet connection or the like -- in fact, virtually any network capable of simultaneously delivering streaming content to multiple users can be used. For networks which provide effectively instantaneous delivery of content, no provisions need to be made for latency in transmission time; however, for those which do exhibit transmission latency
10 (such as the Internet), compensation may be appropriate as will become apparent to those skilled in the art.

These households are connected to the Internet 104 or similar communications network. A typical household 106 contains a viewer/user 108, a device 107 capable of receiving the broadcast signal 102, e.g., a television, radio, computer or other appropriate type of receiving
15 device, and an Internet-enabled client device 109. Preferably, the Internet-enabled client device 109 supports a language like C++ or Java for executing a client application 412 (see Fig. 4) resident thereon as well as a standard Internet protocol, and is connected to the Internet 104 so that the viewer 108 can interact with the client application 412 while viewing the receiving device 107. This client device 109 can either be integrated into the receiver device 107 (e.g., an enhanced TV)
20 or exist as a stand-alone device (e.g., a personal computer or wireless device). Alternatively, the client device 109 can share a screen with the receiver device 107 (e.g., a WebTV or set-top box) or have its own separate screen as shown in FIG. 1. In the following, reference will be made to a

personal computer as the client device 109; however, this is only for the purposes of explanation, and other equivalent devices as described above may also be used.

The client application 412 that runs on the client device 109 stays in synchronization with the broadcast 102 by communicating with the multi-user server system 111, described in greater detail below. The client application 412 receives scripts outlining the flow of events from the multi-user server system 111 and runs the on-line shows and activities according to the timeline laid out in these scripts. It also receives synchronization cues from the control application 112 and server system 111 (also described in greater detail below), thus keeping the script in synchronization with the broadcast 102.

The scripting language is preferably time code-based. The time code may reside on a video tape, audio tape or any other medium. Every event in the activity is pegged to a specific time code, thereby creating a timeline made up of a sequence of key events. These events may include, but are not limited to, sending messages to users 108; displaying graphics, playing animation and playing sounds; delivering advertising content; coordinating interactive actions; and receiving input from the users 108.

For example, a show may start at a time code of 1:00:00:05. This might represent a position of five video frames from the start of a video tape. If the show were a trivia-based game show, the first question could be queued at 01:00:30:05. This would represent an action taking place thirty seconds into the show. In this way, online actions can be synchronized to the time code of the source broadcast medium.

In addition, the client application 412 preferably sends back time-stamped data detailing when specific actions take place locally, i.e., within household 106. There are two types of data reported to the multi-user server system 111: user-initiated data, this data may come from

text entries, chat, responses, instant messaging, etc.; and tracking data which relates to the status of the client application. Data of the first type may include, but are not limited to, answering questions, sending text messages, entering data, and interacting with other on-screen multi-media elements. Preferably, this information is encrypted to prevent alteration by the users 108 or other parties. Further, time stamping the data accommodates variations in latency and bandwidth across the user base 103. Also, it is preferable that the local action reports includes a portion specifying the length and type of report, as well as a sequence number which is used by the multi-user server system 111 to ensure that reports are not taken out of order.

In addition to transmission of such above deliberate activities of the a user 108, the client application 412 preferably also sends back data gathered from other user interactions as data of the second type. These interactions may include data gathered from the user's connection to the server 111, e.g., the activity in which the user 108 is involved; the advertisements the user 108 has seen; where the user 108 goes within the system; and when the user 108 logs on and off of the system.

This data is preferably aggregated and stored in a database 405 residing on the multi-user server system 111 as shown in FIG. 4. This database is used for archiving and tracking information associated with the on-line activities, including user profiles, interaction, scoring results, ad views and other data types. In the archiving process, it is preferably that every user 108 has a unique user profile, and every session in which a user logs on has a unique ID code; thus, data collected during a particular session can be stored according to a unique user ID and session ID. Additionally, the date and time over which each session occurred is known, so that each session can be tracked by any of the above parameters.

FIG. 2 lays out the sync-to-broadcast system flow. It shows the overall flow of the

preferred embodiment, describing how time synchronization information from the original broadcast 102 is distributed by the server 111 to each of the client devices 109, allowing them to display program information in synchronization with the broadcast 102. First, shows are broadcast normally at Step 201; there is no change in how a radio, Internet or television show is broadcast.

5 Additionally, as shown at Step 202, the television 107 or other receiver device received the broadcast 102 while requiring no special hardware.

At Step 203 the client device 109 is preferably in the same room as the television 107 and the user 108 and receives data from the multi-user server 111 via the Internet 104. The client application 412 uses the Internet 104 to establish a real-time socket connection to the multi-
10 user server system 111. From the multi-user server system 111, the client application 412 receives scripts containing synchronization time information, graphics, sound and other assets, as well as on-the-fly messaging and synchronization cues. In Step 204, the multi-user server system 111 coordinates interaction with all the clients 109, distributes the scripts and assets, directs the flow of information, and connects all the clients 109. The multi-user server system 111 also listens for
15 synchronization cues from the control application 112 and distributes synchronization time information to the connected clients 109.

In Step 205, the Internet-connected control application 112 sends the synchronization time information to the multi-user server system 111. This synchronization time information may come from either VBI decoder box 116 as described above or from a manual
20 synchronization control. In Step 209, the broadcaster 101 broadcasts the radio, Internet or television show 102 normally. In Step 208, the broadcast signal may or may not contain a synchronization cue in the VBI. Having a synchronization tone embedded in the VBI by the broadcaster 101 is optional; the system can run without any VBI synchronization tones by using the

manual synchronization controls, although the VBI synchronization tones help to automate the synchronization process. In Step 206, the control application 112 listens for synchronization cues from the VBI decoder box 116 if necessary, and in Step 207 the VBI decoder box 116 decodes synchronization cues embedded in the VBI.

5 In Step 210, data gathered from the on-line users 108 interacting with the client application 412 are aggregated by the multi-user server system 111 and fed back into the broadcast 102 using the control application 112 along with the Chyron 113 or similar device.

 The Internet 104 sits at the core of this application, and all parts of the preferred embodiment communicate over the Internet 104. Although dedicated connections between the
10 multi-user server system 111, the control application 112, the scheduling application 114 and the show scripting application 115 (all described in greater detail herein) could be used, the design of the preferred embodiment eliminates any communication latencies introduced by the Internet 104 due to the use of a network time protocol (NTP) on all Internet-connected applications. Essentially, by transmitting in advance set times to computers which are set by the NTP, actions
15 can be executed in synchronization even though there might have been latency in transmission of the times. Of course, NTP is merely used as an exemplary source of time reference information in the preferred embodiment, and other sources, including proprietary ones, may be used in its place.

 A messaging API for common client / server functions facilitates development of the client application 412 on the client device 109. The messaging API covers over fifty integral
20 commands including, but not limited to, "enter lobby", "request available events", "request available rooms", "create new room(s)", "enter room", "exit room", "request user list for room", "request and edit beeper list", "initiate or respond to private messages". Specific to the synchronization there are commands such as "start event", "end event", "kill event", "speed up

event", "slow down event", "end event" and the like. These commands are accurate to milliseconds. This messaging API is fully extensible for the development of further features. This API utilizes sockets so it is not dependent on any particular language or schema. Any developer language or front end that can interact with sockets can effectively work with the messaging API.

5 The developer is free to display or not display the information retrieved from the messaging API as suits their product.

Returning to FIG. 1, the multi-user server system 111 coordinates and manages the entire process. It provides a true multi-user platform for allowing numerous simultaneous users 108 to interact with one another and with the on-line show. It synchronizes the client devices 109
10 in all households 103 with the server 111. It works in conjunction with the control application 112, scheduling application 114, and show scripting application 115 (all described in greater detail below) to control the synchronization, schedule the on-line shows, send out updated assets such as sound, graphics, video and text files, deliver advertisements, send new script files, and provide and coordinate the various media elements. It preferably gathers time-stamped data from each of the
15 clients 109 and stores this data in a database. It also preferably aggregates other data from the users 108 and stores this data in a database. It makes data in the database available to the control application 112 for integration back into the broadcast 102.

The control application 112 schedules the run time / date for both the sync-to-broadcast shows and activities as well as the on-line non-synchronized shows and activities. It is
20 preferably comprised of the following:

- an optional automatic synchronization control which uses a VBI (Vertical Blanking Interval) decoder box 116 to listen for a tone imbedded in the VBI to synchronize the on-line show with the broadcast 102;

-- a manual synchronization control for synchronizing the on-line show with the broadcast 102, e.g., a button in the control application 112 which can be pressed when the broadcast show starts;

-- a response data control for managing user activity response data information;

5 -- a data integration control for integrating information gathered from the users 108 back into the live television, radio or Internet broadcast 102 -- for example, determining the highest scoring users 108 in a broadcast competition and feeding those scores back into the television broadcast using the control application 112 which can gather the high scores from the database 405 of the multi-user server system 111 and display them on a computer screen, the image then being
10 captured using a Chyron 113 and integrated into the broadcast signal 102;

-- a broadcast message control for sending a real-time message to the users 108, e.g., a message that the show is delayed, that a new show will air next week, or that a new prize is being offered;

-- a server status control for displaying the status of the server 111 to the system
15 operator;

-- a start / stop control for manually starting and stopping the on-line show, thereby allowing the operator of the control application 112 to terminate a show due to technical difficulties, scheduling problems and the like;

-- a slip synchronization control for manually shifting the synchronization forward
20 or backward by a number of milliseconds, useful because manual synchronization control may be inaccurate or the broadcast is faulty and VBI information does not start online activities at the correct time;

-- a kill control for terminating a specific function within an on-line show; and

-- a run reports control for generating reports on usage, user profiles, scores, response data, advertising and other information present in the database.

A Chyron 113 or a device similar in functionality, i.e., one that can place graphics or text in a television display, is used to integrate data back into the live television, radio or Internet broadcast 102.

The scheduling application 114 provides a tool for scheduling the time / date of both on-line sync-to-broadcast shows and on-line non-synchronized shows. The scheduling application 114 essentially sets up a calendar in which dates and times of activities corresponding to events in on-air broadcasts are entered. In advance of these times, corresponding scripts are assembled and sent to clients 109 to run in synchronization with broadcasts 102. This system can easily be used with non-synchronized activities as well as sync-to-broadcast shows.

The show scripting application 115 is used for creating controlling scripts for on-line sync-to-broadcast shows. It is comprised of the following: a script generator for matching specific on-line actions with time code from video tapes; an asset integration tool for adding text, artwork, sounds and music to the on-line shows; an editor for modifying the scripts and assets; and an uploading routine for saving the scripts on the multi-user server system 111. The use of the scripting application for videotaped shows will be readily apparent to those skilled in the art. For live shows, rough synchronization may be obtained if general event timings are known, or sequences of events, e.g., in the case of a football game, can be predicted.

The VBI decoder box 116 decodes synchronization cues embedded in the VBI. Preferably, the control application 112, scheduling application 114, show scripting application 115, client application 412, and multi-user server system 111 all communicate via the Internet 104.

As shown in FIG. 3, the multi-user server system can work with a variety of different devices, as long as these devices are Internet enabled, support standard Internet protocol and support a programming language such as C++ or Java. The first component shown is a receiver device 107. This can be a television, radio, computer or some other device that can receive the broadcast signal 102. A user 108 views the broadcast and interacts with the client application 412 resident on the client 109.

The multi-user server system 111 can communicate with the client application 412, which can be deployed on a wide variety of devices as shown by devices 109 and 109a-109d. One possible device 109 is an Internet enabled PC running Windows or another operating system. This device communicates with the multi-user server system 111 over the Internet 104. Another possible device 109a is a WebTV-type device that supports a programming language and standard Internet protocol. Another possible device 109b is an enhanced set-top box that supports a programming language and standard Internet protocol. Yet another possible device 109c is a wireless unit that supports a programming language and standard Internet protocol. Still another possible device 109d is an enhanced TV, digital television or radio that supports a programming language and standard Internet protocol. Additionally, although not shown in FIG. 3, other devices may be used, such as a cellular telephone, personal digital assistant, tablet device or any other Internet connected device which supports a programming language and standard Internet protocol. All of these devices 109 and 109a-109d can communicate with the multi-user server system 111 through the Internet 104. Basically, any client platform that supports sockets can be used to develop sync-to-broadcast activities.

As shown in FIG. 4, the multi-user system server 111 preferably has two main components: the primary server 402 and the secondary server or servers 407. The primary server

402 accepts users, validates them (preferably using a user ID/password scheme or similar technique as is known in the art) to ensure that the users 108 are registered and are connecting from the proper client 109, and handles the process of moving them from room to room where various activities, e.g., chat, games, etc., take place. The secondary server 407 is responsible for
5 monitoring a set of rooms that are all on that server. When the load manager application 403 assigns a user to a room, it hands that user off to an activity manager application 408. When an activity is over, the activity manager application 408 reports any outcome information to the load manager application 403. There is a separate activity manager application 408 for each server 407.

The client application 412 makes its initial connection over the Internet 104 with the
10 load manager application 403. The load manager application 403 deals with the specific problem of managing large numbers of users and activities scaled across multiple servers 407 and the like. It communicates with other server components and client applications 412 using TCP/IP. The load manager application 403 resides on the primary server 402 or servers. When the load manager application 403 initially launches, it queries the system database 405 for scheduled events and pre-
15 allocated rooms. When it has received this data, it listens for each of the activity manager applications 408 to connect. Upon completion, each activity manager application 408 is told which events and rooms to load. By querying the database, the load manager application knows which activities -- trivia games, puzzles, chat, opinion polls, user feedback sessions and the like -- are present in which rooms and how to route users to and from those rooms.

20 The load manager application 403 authenticates the user 108 by accessing the user database 405. When a user 108 has been validated (and preferably information on which activities the user's client 109 can support is obtained therefrom), they are placed into the lobby. The lobby is a place where users 108 can choose to enter or be assigned to rooms containing different

activities. Its primary purpose is to enter users into the system and move them into activity rooms.

Users 108 in the lobby preferably may be asked to choose from a dynamically changing list of available events and rooms, or they may be placed automatically into rooms assigned by the load manager application 403. Once they have either selected an available room or
5 been assigned one, the load manager application 403 places them in the room and, at this point, they become the responsibility of the activity manager application 408. Users may re-enter the lobby in order to move to another activity room.

Network time protocols servers 406 and 410 provide critical time synchronization information to all software components; in the preferred embodiment, these are NTP servers,
10 although as noted above other synchronization information sources may alternatively be used. On the primary server 402 side, a primary NTP routine 406 provides the initial time synchronization which is coordinated with a source of time reference information. This primary time synchronization is accessed by the activity manager applications in each of the secondary servers 407 in the system. Accuracy is in the milliseconds within the system. As each client 109 logs onto
15 the system, they too access the time synchronization information. Accuracy of this time synchronization over the Internet 104 ranges from the tens of milliseconds to a second. All events precipitated by the server are cued relative to their NTP time, and are displayed by the clients according to their NTP time.

For example, when the initial cue to start a segment is received, this cue is
20 "stamped" with the NTP time at which it was received. When this cue is distributed to the client machines 109, they can then calculate when to display the cues within the segment relative to their own NTP time. In this way, it is possible to retain synchronization between the server 111 and each connected client application 412 over the course of the synchronized event without any clients

109 being hindered by latency. Periodic checks against the server's NTP time are made to keep client machines 109 synchronized within one second of each other and the server 111.

In this way, the NTP is used to provide synchronization information over the Internet, rather than over a dedicated LAN as is customarily the case. It is believed that this NTP Internet synchronization technique has not been practiced in the prior art and is unique to the present invention. Also, as noted above, although NTP is used in this presently preferred embodiment, other sources of synchronization information may alternatively be used, including proprietary or semi-dedicated sources.

Activity modules 409 are the client/server software pieces that the user 108 interacts with during the course of an event. These modules are loaded and unloaded based on commands from the load manager 403. For example, the load manager 403 may instruct the multi-user server system 111 to load a trivia game activity into a number of rooms and make those rooms available at 3 p.m. to anyone logging into the system from a specific client application 412 associated with a specific broadcast. Alternatively, the load manager 403 may instruct the multi-user server system 111 to unload the trivia games at 4 p.m. and replace them with other activities such as chat sessions or puzzles.

Examples of sync-to-broadcast program modules include, but are not limited to, user registration, chat, games, polling, advertisements, e-commerce links, rankings, and announcements. Activity modules 409 encapsulate the rules and structure of a single sync-to-broadcast activity or program, and may do so essentially as hard-coded programs or software modules.

Media 409 may be stored on either the client 109 or the server machines 402 and 407. In order to reduce bandwidth usage during critical moments, essential media is installed or cached on the client machine 109 prior to cue time. Updateable media, such as advertising or new

game files, may be streamed either from the multi-user server system 111 or from external links. Web services 404 and 411 are used to serve up web pages, script files, assets, client applications, and any required media elements or software. Web services 409 and 411 may also include an ad server for delivering on-line advertising synchronized with the broadcast commercials.

- 5 The communication responsibilities of the load manager application 403 are:
- start server system 402 with customizable parameters;
 - listen for activity manager applications 408 and ask them to load room-specific activity;
 - listen for clients 109 on a specified port;
 - 10 -- verify clients 109 are valid;
 - maintain available room information;
 - move clients 109 from room to room as required or requested;
 - receive information from each of the activity managers 408;
 - write information to user database 405; and
 - 15 -- propagate customizable web updates as scheduled.

Once all the activity manager applications 408 have connected, the load manager application 403 communicates a list of events and rooms to load. When a user 108 selects an event and room or is assigned to one, the load manager application 403 passes them to the activity manager application 408. Once a user 108 is in a room, their client application 412 speaks directly to the activity manager application 408 until they need or request to be placed into another room.

20

The activity manager application 408 may be thought of as a conduit between the load manager application 403 and the individual clients 109. There is one activity manager application 408 for every server in the system except the primary server 402 (although in

alternative embodiments, an activity manager 408 may be operative on the primary server 402 as well). The responsibilities of the activity manager application 408 are:

- listen to the load manager application 403;
- set up threads to handle each activity; dynamically load activity-specific DLLs

5 (relatively small software programs downloaded to the client application 412 which are designed to run applications such as chat, trivia games, etc.);

- listen for clients 109 and direct them to the proper room; and
- report information to the load manager application 403.

Every room has two threads, one thread accepts client 109 into the room, and
10 another thread controls the room and handles the data exchange back and forth. In addition to room threads, the load manager application 403 also maintains threads. The load manager application 403 is a server to the clients 109, to the activity manager applications 408, and to the control application 112. For each of these, the load manager application 403 maintains two threads, one to accept new connections, and one to regulate the data among the connections.

15 The load manager application 403 accesses database 405 preferably using ODBC or a similar access scheme to keep track of the following information: user profile; user activity; event information; room information; and results tracking such as high scores and usage data. This information is valuable to sponsors and advertisers and can also be used to provide data which can be used in the on-air component. The activity results are items that can be propagated to the
20 broadcast community 102 so users 108 can see how they rank. Ranks and other results can also be propagated automatically to a customized web page for review.

FIG. 5 is a time-based chart illustrating the flow of events in a sync-to-broadcast show according to the preferred embodiment. First, in Step 501 an on-line show is created using

the show scripting application. In Step 502, the on-line show is scheduled using the scheduling application. In Step 503, a synchronization tone may or may not be imbedded in the VBI of broadcast 102. This is an optional step dependent on the level of cooperation of the broadcaster. In Step 504, the broadcast 102 is aired. Using decoder box 116, Step 505 detects whether or not a VBI synchronization tone is present in broadcast 102. In Step 506, if there is a synchronization tone embedded in the VBI, the decoder 116 will pick up the synchronization tone and transmit it to the control application 112. In Step 508, if there is no tone embedded in the VBI, the control application operator must manually start the sync-to-broadcast on-line show. In Step 507, the control application automatically starts the sync-to-broadcast on-line show.

Meanwhile, in Step 509 the user 108 runs the client application 412 on an Internet-connected client device 109 while tuning into the broadcast 102. In Step 510, the user 108 logs into the system. In Step 511, the client application 412 then automatically downloads the appropriate script and other assets for the show from the multi-user server 111. In Step 512, if the user 108 logs on before the sync-to-broadcast show has started, the user 108 may be directed to engage in other related on-line activities. For example, if the on-air/online show has not yet started, the user 108 may be placed in a chat room or a game room where they can spend time talking to other players before the show is scheduled to start. When the show does start, the activity manager 408 may assign a new activity to the room which corresponds to the broadcast, or the user 108 will automatically be moved into another room where the appropriate sync-to-broadcast activity will take place.

In Step 513, when the sync-to-broadcast show commences, the user 108 is entered into a real-time, multi-user sync-to-broadcast on-line show. In Step 514, the client application 412 follows the show script, keeping in synchronization with the specified timing. In Step 515, to

avoid problems with Internet latency and bandwidth variations, the client application 412 time stamps local actions. In Step 516, the show script tells the client application 412 to wait and listen for additional synchronization commands from the multi-user server system 111. In Step 517, the client application 412 also responds to any manual or on-the-fly commands from the control
5 application 112. In Step 518, after the sync-to-broadcast on-line show ends, the user 108 is returned to on-line non-synchronized activities.

The present invention has been described above in connection with a preferred embodiment thereof; however, this has been done for purposes of illustration only, and the invention is not so limited. Indeed, variations of the invention will be readily apparent to those
10 skilled in the art and also fall within the scope of the invention.

WHAT IS CLAIMED IS:

1. A method of synchronizing on-line content with a broadcast, the method comprising:
 - transmitting a broadcast signal to a first user reception device via a first medium;
 - transmitting timing information corresponding to information in the broadcast signal to a second user reception device via a second medium; and
 - using the second user reception device to generate user-perceptible indicia at times corresponding to the timing information.
2. The method of claim 1, wherein the broadcast signal is one of a television broadcast signal and a cable broadcast signal.
3. The method of claim 1, wherein the first user reception device is a television.
4. The method of claim 1, wherein the first medium is a television broadcast spectrum.
5. The method of claim 1, wherein the first medium is a cable television network.

6. The method of claim 1, wherein the information in the broadcast signal to which the timing information corresponds are events in a show.

7. The method of claim 1, wherein the second user reception device is capable of communicating via the Internet.

8. The method of claim 1, wherein the second medium is the Internet.

9. A system for synchronizing on-line content with a broadcast, the system comprising:

a receiver to receive timing information corresponding to information in a broadcast signal via a reception medium, the timing information corresponding to information in a predetermined broadcast signal; and

a display device to generate user-perceptible indicia at times corresponding to the timing information, the user-perceptible indicia corresponding to content of the broadcast signal.

10. The system of claim 9, wherein the receiver is capable of communicating via the Internet.

11. The system of claim 9, wherein the reception medium is the Internet.

12. The system of claim 9, wherein the display device is a personal computer.

13. A client device for a sync-to-broadcast system, the device comprising:
communication means for establishing communication between the client device and a communication network;

timing reception means for receiving via the communication means timing information corresponding to events in a broadcast signal; and

display means for generating user-perceptible indicia at times corresponding to the timing information, the user-perceptible indicia corresponding to content of the broadcast signal.

14. The client device of claim 13, further comprising synchronization means for receiving via the communication means synchronization cues and using the synchronization cues to synchronize indicia generated by the display means with the broadcast signal.

15. The client device of claim 13, further comprising:
input means for receiving user commands relating to indicia generated by the display means and processing the commands; and

local action reporting means for transmitting via the communication means information relating to the user commands over the communication network.

16. The client device of claim 15, wherein the information transmitted by the local action reporting means includes at least one of answers to questions, text messages, activities in which the user is involved; advertisements the user has seen; and login status of the user.

17. The client device of claim 13, wherein the communication means and timing reception means are resident in one of a WebTV device, a set top box and an enhanced television.

18. The client device of claim 13, wherein the communication means, timing reception means and display means are resident in one of a personal computer and a wireless device.

19. A multi-user server system for connecting multiple users over the Internet comprising:

communication means for establishing communication between the server and a communication network;

a load manager application for communicating via the communication means with a plurality of client devices and partitioning each client device into one of a plurality of rooms; and

activity manager means for communicating via the communication means with the plurality of clients to exchange data therewith, the data corresponding to

activities activities associated with the room to which each client device has been assigned.

20. The multi-user server system of claim 19, further comprising web service means for serving via the communication means at least one of web pages, assets, software and media to the plurality of client devices based on rooms to which the client devices have been partitioned.

21. The multi-user server system of claim 19, further comprising advertising service means for serving on-line advertising synchronized with commercials in the broadcast signal.

22. The multi-user server system of claim 20, further comprising:
at least one media library containing at least one of graphics, video, sound,
an animation;

wherein the web service means is further for retrieving information from the media library and serving it via the communication means.

23. The multi-user server system of claim 19, further comprising:
archiving means for receiving via the communication means information related to on-line activities of the plurality of client devices; and
a database for storing and tracking the on-line activity information.

24. The multi-server system of claim 23, wherein the on-line activity information includes at least one of user profiles, interaction, scoring results and ad views.

25. A control system for an on-line sync-to-broadcast show, the system comprising:

communication means for establishing communication between the system and a communication network;

synchronization control means for transmitting via the communication means information for controlling synchronization of an on-line show with a broadcast signal; and

data integration control means for generating a signal representative of information gathered via the communication means to be integrated into the broadcast signal.

26. The system of claim 25, wherein the synchronization control means includes an automatic synchronization control responsive to a tone imbedded in a vertical blanking interval of the broadcast signal to transmit via the communication means information to synchronize the on-line show with the broadcast.

27. The system of claim 25, wherein the synchronization control means includes a manual synchronization control for transmitting via the communication means

information to synchronize the on-line show with the broadcast responsive to an operator action at the control system.

28. The system of claim 25, wherein the synchronization control means includes slip synchronization control means for transmitting via the communication means information to slip synchronization between the on-line show and the broadcast signal responsive to an operator action at the control system.

29. The system of claim 25, further comprising flow control means for transmitting via the communication means information to control a flow of information within the on-line show.

30. The system of claim 29, wherein the flow control means includes a start/stop control for transmitting information via the communication means to manually start and stop the on-line show responsive to an operator action at the control system.

31. The system of claim 29, wherein the flow control means includes kill control means for transmitting via the communication means information to terminate a specific function within the on-line show.

32. The system of claim 25, further comprising message transmission means for sending via the communication means a real-time message for viewers of the broadcast signal and on-line show.

33. The system of claim 25, further comprising standings control means for managing the information received via the communication means relating to viewers of the broadcast signal and on-line show.

34. The system of claim 25, further comprising server status reporting means for displaying information relating to status of the system.

35. The system of claim 25, further comprising user reporting means for generating reports on information received via the communication means relating to user usage, user profiles, scores and advertising.

36. A show scripting system for sync-to-broadcast shows, the system comprising:

communication means for establishing communication between the system and a communication network;

script generator means for receiving via the communication means information representative of on-line actions of users viewing an on-line show and a broadcast based on a medium and based on that information generating a script matching specific on-line actions with time codes from the medium;

asset integration means for adding text, artwork, sounds and music to the on-line show script;

editing means for modifying the scripts and assets; and

uploading means for transmitting the script via the communication means.

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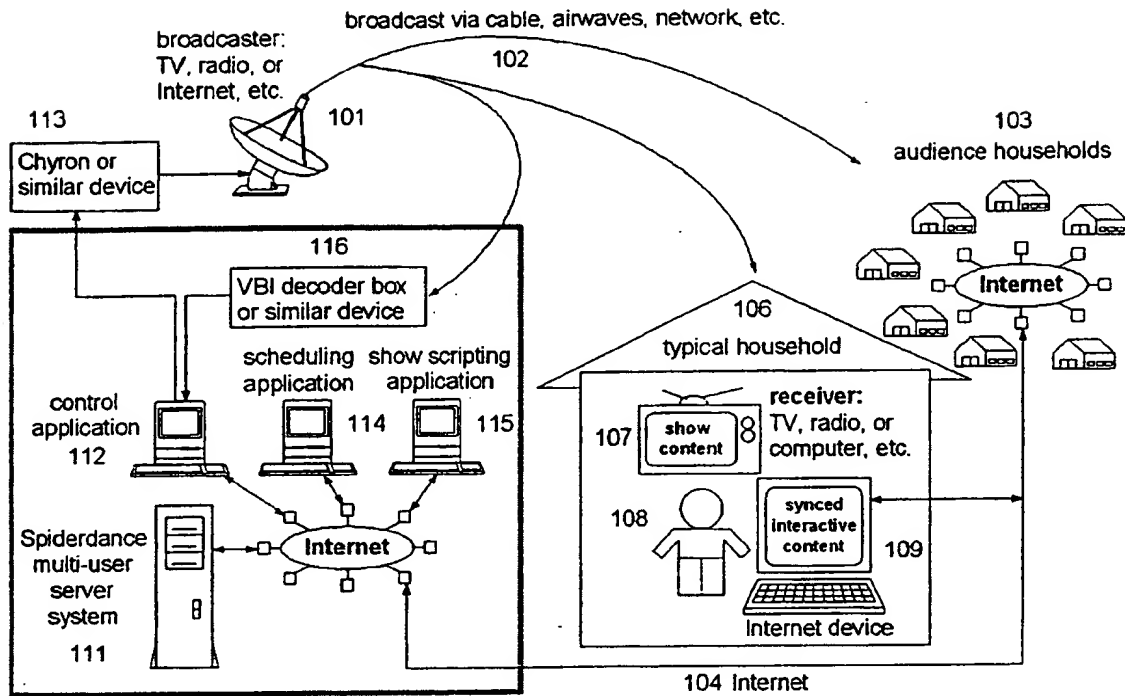
Fig. 1 **System Overview**

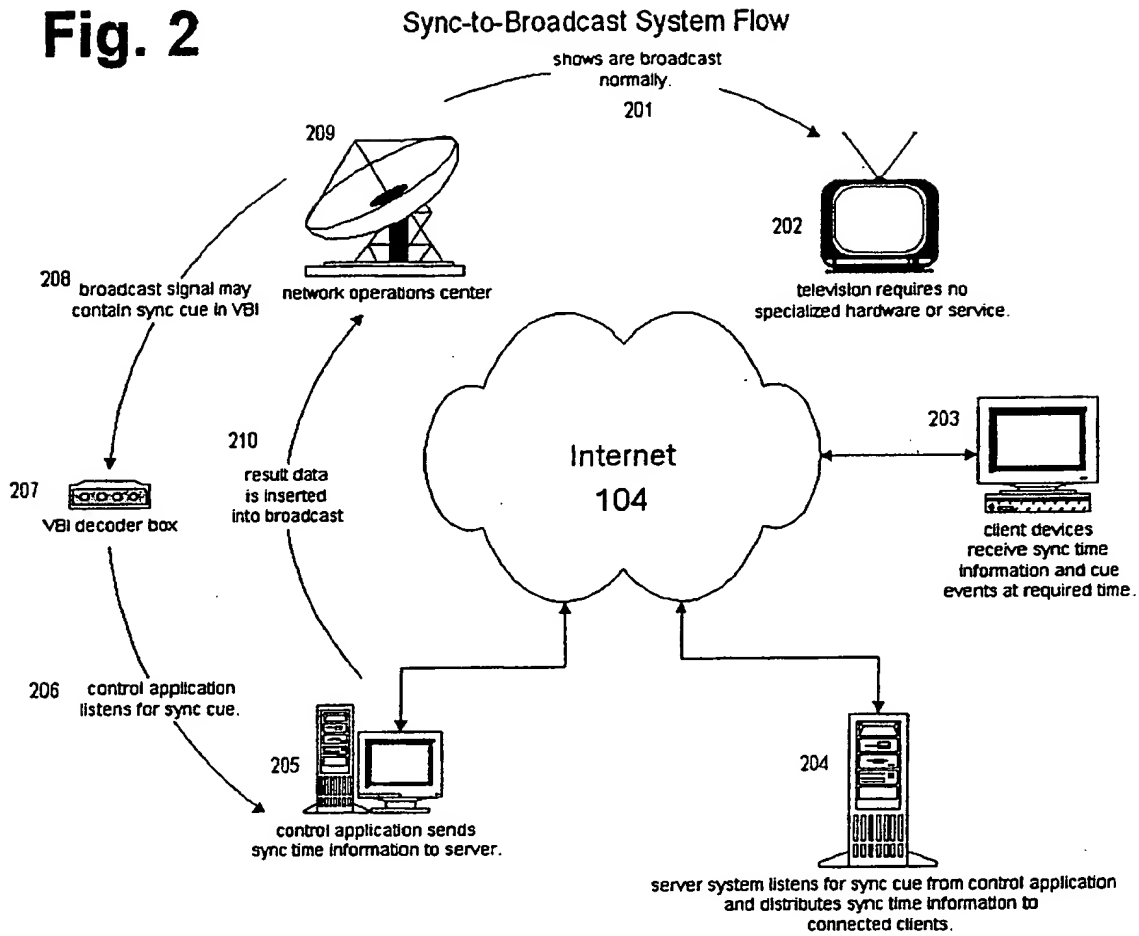
Fig. 2

Fig. 3

Synced Devices

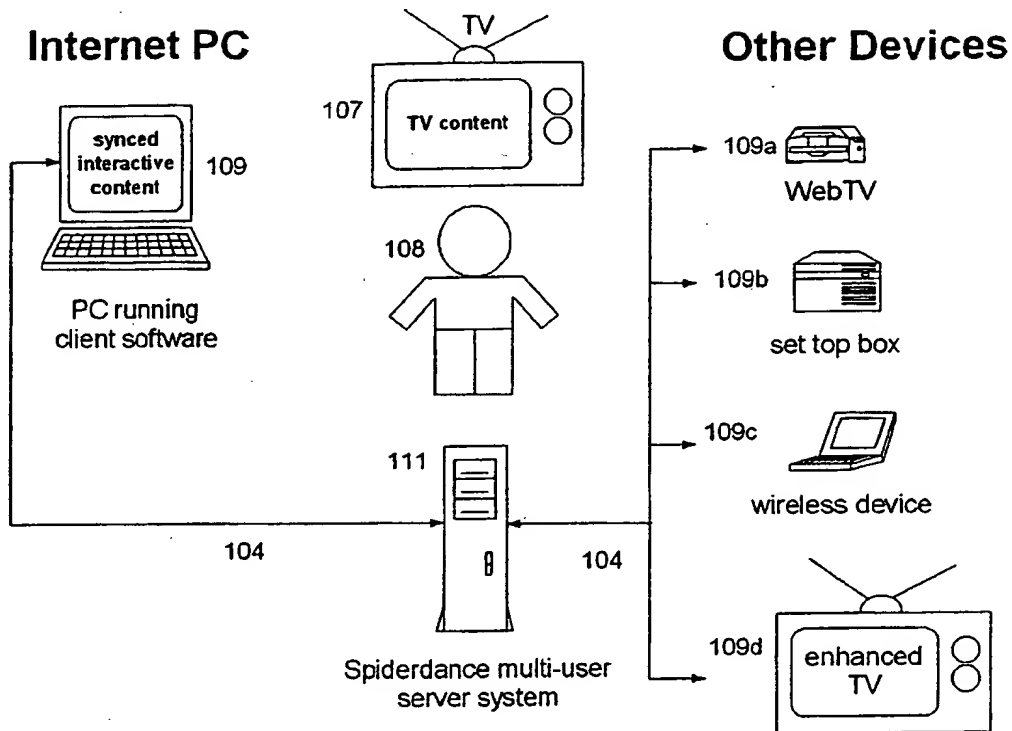


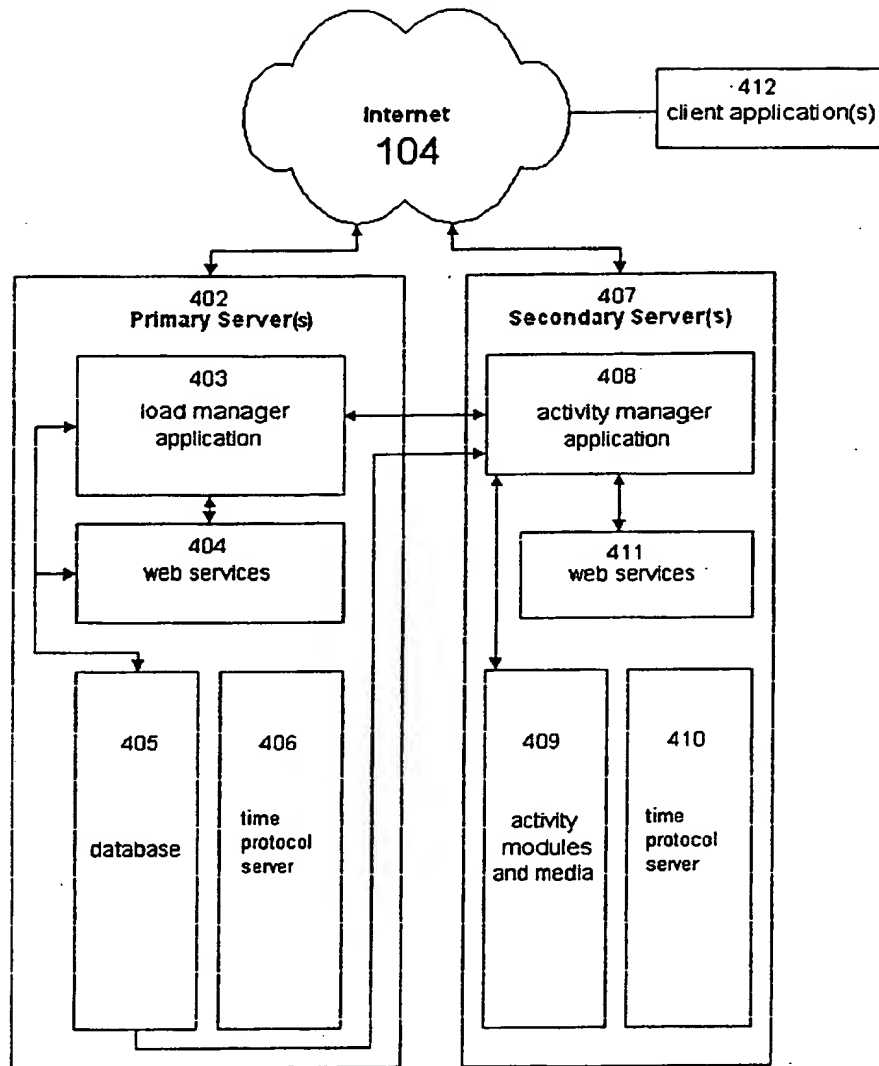
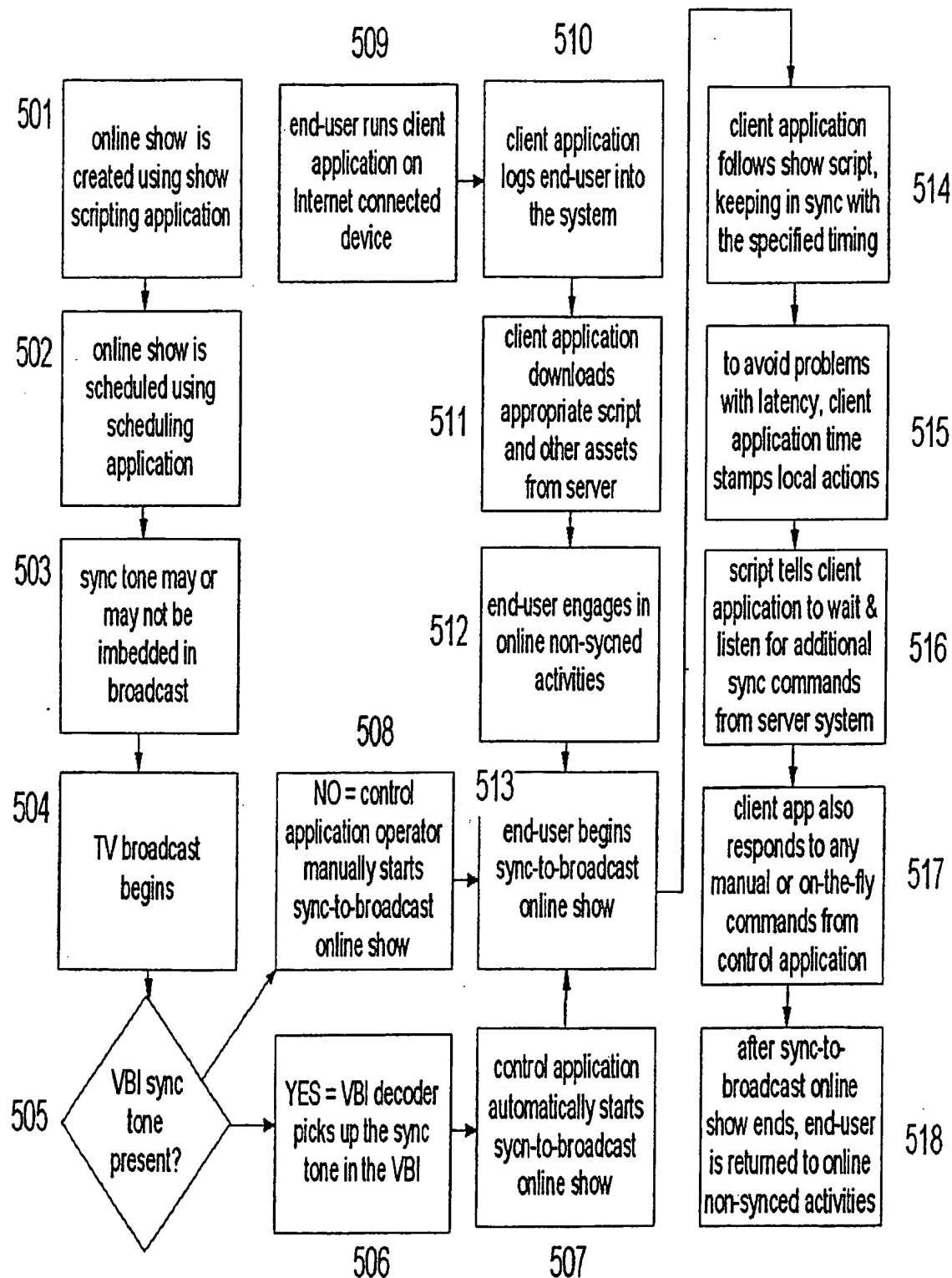
Fig. 4**Spiderdance Server Configuration**

Fig. 5 Time-based Flow Chart



(10) International Publication Number
WO 01/39506 A3

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(S7) Abstract: A system allows large numbers of users to engage in on-line, multi-user shows that are synchronized to broadcasts of prerecorded or live shows and also simultaneously aggregates user input from such shows and feeds it back into the broadcast. First, a user launches client application on an Internet-accessible platform. The client application connects to a multi-user server system. This multi-user server system allows all of the concurrent users to engage in a single multi-user, on-line activity that can run independently or in synchronization with a broadcast. The multi-user server system is also capable of running numerous on-line activities simultaneously, each of which can be synchronized to a separate broadcast. As the users interact with the on-line activities, the multi-user server system can aggregate data relating to the users or their actions, save this data in a database, and feed this back into the broadcast. The multi-user server system also includes the ability to send messages to all the users or specific groups of users, adjust the synchronization of the on-line shows, schedule on-line shows, and create scripts for running the shows in synchronization with the broadcasts.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/42248

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04N7/173

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04N H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| X | <p>PATENT ABSTRACTS OF JAPAN vol. 1999, no. 01, 29 January 1999 (1999-01-29) & JP 10 285460 A (NIYUUZU LINE NETWORK KK), 23 October 1998 (1998-10-23) abstract</p> <p>---</p> <p>-/--</p> | <p>1-14, 17, 18</p> |

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
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- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- * & * document member of the same patent family

Date of the actual completion of the international search

22 October 2001

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/42248

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|------------------------------------|
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| A | <p>WO 97 50249 A (STENTOR RESOURCE CENTRE INC) 31 December 1997 (1997-12-31) abstract page 6, line 18 -page 7, line 34 page 10, line 29 -page 11, line 34 page 12, line 10 - line 16 page 12, line 25 - line 32 page 14, line 4 - line 14 page 14, line 35 -page 15, line 28 page 16, line 12 -page 17, line 4 page 18, line 10 -page 19, line 2 figures 3,4 claims 1,6,8,10,15,17-19</p> | 1-36 |

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INTERNATIONAL SEARCH REPORT

Interr. nal Application No

PCT/US 00/42248

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|---|-----------------------|
| A | US 5 530 469 A (GARFINKLE NORTON) 25 June 1996 (1996-06-25) column 1, line 44 -column 2, line 12 claims 1-3,5,6 --- | 1-36 |
| A | US 5 694 163 A (HARRISON EDWARD R) 2 December 1997 (1997-12-02) abstract column 2, line 31 -column 3, line 6 column 3, line 53 -column 4, line 20; figure 1 column 5, line 16 -column 6, line 9; figures 3,4 claims 1-6,8-13 ----- | 1-36 |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 00/42248

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-8, 9-12, 13-18

relate to synchronizing on-line content with broadcast events (see description page 1, lines 19-23 and page 3, line 11)

2. Claims: 19-24

relate to aggregating user inputs (see description page 1, line 20 up to page 2, line 3 and page 3, line 12)

3. Claims: 25-35, 36

relate to feeding user data into a broadcast (see description page 2, lines 3-4 and page 3, lines 12-13)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/42248

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